

CLAIMS

1. A tire building system comprising: workstations configured to mount applicable tire components onto a building drum, respectively; a building carriage configured to support the building drum to thereby
5 move the building drum among the respective workstations; and carriage guiding means for guiding a movement of the building carriage on a predetermined path;

wherein said carriage guiding means comprises: two inner and outer endless rails laid mutually parallel; and wheels provided on said building
10 carriage, said wheels each being configured to roll, via roller or ball, on at least opposite side surfaces of associated one of said endless rails to thereby restrict a carriage position in a direction orthogonal to an extending direction of said endless rails; and

wherein said endless rails are each configured with at least one
15 straight portion and at least one arcuate portion which are smoothly continued to each other, and said arcuate portion has a rail width narrower than a rail width of said straight portion by an amount corresponding to a radius of curvature of said arcuate portion.

2. The tire building system according to claim 1, wherein said
20 endless rails are each configured with mutually parallel straight portions at two locations and arcuate portions at two locations for connecting opposite ends of said straight portions with each other, respectively.

3. The tire building system according to claim 1 or 2, wherein said wheels are each provided with a plurality of rollers or balls
25 configured to roll on side surfaces of the associated endless rail.

4. The tire building system according to claim 3, wherein said wheels each includes: at least two rollers or balls mutually separated most in plan view thereof so as to contact with an inside surface of an arc at said arcuate portion of the associated endless rail; and one or two
30 rollers or balls located at a position in between said two rollers or balls so as to contact with an outside surface of the arc at said arcuate portion.

5. The tire building system according to any one of claims 1 through 4, wherein said wheels of said building carriage includes two

wheels and two wheels to be engaged with said inner and outer endless rails, respectively,

wherein said wheels are altogether made swingable about associated vertical central axes, respectively, and

5 wherein the vertical central axes of those of said wheels which are engaged with one of said inner and outer endless rails are made displaceable in the direction orthogonal to the traveling direction of said building carriage.

6. The tire building system according to any one of claims 1
10 through 4, wherein said wheels of said building carriage includes three or more wheels and three or more wheels to be engaged with said inner and outer endless rails, respectively,

wherein said wheels are altogether made swingable about associated vertical central axes, respectively, and

15 wherein the vertical central axes of those totally two front and rear wheels of said wheels which are engaged with one of said inner and outer endless rails, and the vertical central axes of those intermediate ones of said wheels which are engaged with both said endless rails, are made displaceable in the direction orthogonal to the traveling direction of said
20 building carriage.

7. The tire building system according to any one of claims 1 through 6, said wheels of said building carriage are each configured with a slide table of a ball circulation type.

8. The tire building system according to any one of claims 1
25 through 7, wherein said building carriages are each provided with engaging/supporting means for a free end of a building drum cantilever supported by an adjacent one of said building carriages.

9. A tire building system comprising a building unit, said building unit including:

30 a toroidal building drum having: a bead lock portion configured to fix a pair of bead cores; and a scalable and displaceable rigid core body configured to support, from a radial inside, a carcass band toroidally bulged between said pair of bead cores;

a building carriage configured to rotatably supporting said toroidal building drum;

workstations configured to mount applicable tire components onto a tire in the course of building and having the bead cores locked by said
5 toroidal building drum; and

an endless or ended track configured to guide a movement of said building carriage among said workstations.

10. The tire building system according to claim 9, further comprising a first building unit configured to deliver a cylindrical carcass band to said building unit as a second building unit;
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wherein said first building unit comprises: a cylindrical building drum configured to form the carcass band; a building carriage configured to rotatably support said cylindrical building drum; a plurality of workstations configured to mount applicable tire components onto said
15 cylindrical building drum; and an endless or ended track configured to guide a movement of said building carriage among said workstations.

11. The tire building system according to claim 9 or 10, wherein said track of said second building unit is made endless.

12. The tire building system according to claim 11, wherein said
20 track has mutually substantially parallel straight portions, and said workstations are arranged correspondingly to both said straight portions.

13. The tire building system according to any one of claims 10 through 12 wherein said track of said first building unit is made straight.

14. A tire manufacturing system including a tire vulcanizing system
25 disposed adjacently to said tire building system according to any one of claims 9 through 13,

wherein said tire vulcanizing system comprises:

a plurality of vulcanizing stations configured to accommodate green tires conveyed from said building system, into associated vulcanizing
30 molds to vulcanize the green tires, respectively;

a mold opening/closing station configured to open and close said vulcanizing molds taken out of said vulcanizing stations, respectively;
and

a bladder attaching/detaching station configured to attach a bladder to a green tire and to detach the bladder from a vulcanized tire.

15. The tire manufacturing system according to claim 14, wherein said vulcanizing stations are arranged on an arc around said mold
5 opening/closing station as a center.

16. A tire manufacturing method for sequentially moving a tire, in the course of building, through a plurality of workstations included in a building system to thereby sequentially mount tire components previously determined correspondingly to the workstations, respectively,
10 onto the tire to thereby build the same into a green tire, the method comprising the steps of:

sequentially, at one or more of the workstations,
disposing a cylindrical carcass band and a pair of bead cores onto a toroidally scalable toroidal building drum to thereby lock the bead cores,
15 radially expanding the building drum to toroidally extend the carcass band between both bead cores, and
turning back side portions of the carcass band to radial outsides around the bead cores, respectively, and
thereafter, at another or other workstations,
20 mounting tire components including sidewall members onto the carcass band and bead cores while the bead cores are kept locked on the toroidal building drum, to thereby build them into a green tire; and
radially contracting the toroidal building drum, and unlocking the bead cores to detach the green tire from the building drum.

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